

The mobile phone has become a constant companion for many people, the essential advantage of mobile phones being that the respective mobile phone subscriber can be reached at any time.

However, being reachable at all times also has its disadvantages. In many 5 locations in a mobile radio network the use of mobile phones is not desired. For example, the use of a mobile phones in concert halls, cinemas, churches, restaurants, etc., is undesired; in particular, the signaling sounds generated by the mobile phones when incoming calls are received are considered to be a nuisance. In other areas, for example in aircraft or hospitals, the use of mobile phones is even 10 forbidden owing to the disadvantageous influence on the high-frequency-sensitive electronics. For this reason, mobile radio subscribers are requested verbally or via signs not to use their mobile phones in the corresponding areas. In some cases, the use of mobile phones is also forbidden by law.

However, for such provisions to be effective, it must be possible to rely on 15 the decency and reliability of mobile radio subscribers or owners of mobile phones. However, because mobile phone subscribers are frequently lacking in the necessary considerateness, possible ways for automatically protecting specific locations against the disruptive use of the mobile phones have already been developed. For example, it is known to install jamming transmitters which intentionally prevent 20 calls being enabled with mobile phones in a specific area, for which purpose the jamming transmitters superimpose signals on the signals of incoming and outgoing calls. Furthermore, devices are also known which change the radio transmit power of the base stations of the mobile radio network within a specific range, thus preventing contact or a connection setup between the mobile phones and the base 25 station. Finally, it is also known to install small transmitters at the entrances to rooms in which the use of mobile phones is to be prevented, which transmitters switch off any mobile phone by remote control using a corresponding radio signal when the subscriber passes the transmitter. When the subscriber leaves such rooms, the mobile phones are then switched on again by the transmitter.

30 However, mobile phone network operators are obliged to provide a mobile radio network with an area coverage that is as comprehensive as possible. This is

thus restricted by the measures described above, such that the legal acceptability of such measures or devices is currently still under debate. In addition, the possible negative effects of such measures on technical and electronic devices is not yet clear.

5 The present invention is, therefore, directed toward proposing an alternative method for operating mobile terminals and a corresponding mobile radio system, it being possible to reliably control the use or non-use of mobile phones within the mobile radio system.

#### SUMMARY OF THE INVENTION

10 The present invention defines chronological and/or spatial non-use ranges which are monitored within the mobile radio system. The spatial non-use ranges can be defined both by the mobile radio subscriber himself/herself and by a corresponding point which has the non-use range. In contrast, chronological non-use ranges are generally prescribed only by the corresponding mobile radio 15 subscriber, it being possible to connect these chronological non-use ranges, in particular, to the organizer of the mobile radio subscriber.

In order to monitor spatial non-use ranges, corresponding monitoring measures are provided which sense the position of the corresponding mobile terminal, for example of a mobile phone, within the mobile radio network. These 20 monitoring measures can be connected, for example, to the GPS (Global Positioning System) system and thus permit positions to be determined by satellite. Likewise, the position of any mobile terminal can be determined in relation to the known geographic position of three base stations or via cell identifiers (Cell Ids) using a triangulation method.

25 If it is detected within the mobile radio system, via time monitoring or position monitoring of the mobile terminal, that one of the predefined non-use ranges has been reached, a corresponding non-use action, which is intended to ensure non-use of the respective mobile terminal, is automatically initiated. This action can be, for example, the automatic transmission of a message (for example, 30 of an SMS (Short Message Services)) to the mobile terminal, the activation of an automatic call forwarding facility or automatic switching off of the mobile

terminal. It is recommended here to adapt the "severity" of the respectively selected action to the instantaneous distance from the respective non-use range, so that a mobile phone is, for example, forcibly switched off automatically only if the mobile phone is less than 10 m away from the corresponding non-use range.

5 The present invention thus permits both the passive request and an active request, i.e. self-selected by the mobile radio subscriber, for the non-use of the mobile terminal as a function of the instantaneous geographic position and/or time. The control of the non-use facility is always carried out within the respective mobile radio system in that corresponding measures are taken at the mobile 10 terminal itself or via the network operator; i.e., no external or additional transmitters are provided and are thus not necessary either. In particular, the maintenance of a mobile radio system with comprehensive area coverage is ensured because, for example, the transmission power of the base station, etc., is not manipulated. Moreover, the "degree of severity" of the request not to use the 15 mobile terminal can be adapted to the urgency of such a measure.

Additional features and advantages of the present invention are described in, and will be apparent from, the following Detailed Description of the Invention and the Figures.

#### BRIEF DESCRIPTION OF THE FIGURES

20 Fig. 1 shows a preferred block circuit diagram of an exemplary embodiment of the mobile radio system of the present invention.

Fig. 2 shows a flowchart of an exemplary embodiment of a method according to the present invention which can be applied in the mobile radio system shown in Fig. 1.

#### 25 DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 shows, in a way which is representative of a mobile radio system, a base station 1 and a mobile phone 2 which communicates with the latter over a mobile radio channel 5. Modern mobile radio networks generally have a cellular structure, each radio cell being assigned a base station 1 which is responsible for 30 the mobile phones 2 which are located within this radio cell at any given moment, and additionally serves as an interface to the telephone fixed network so that not

only calls between different mobile phones 2 but also between a mobile phone 2 and a fixed network terminal (not shown) can be made.

A mobile radio system includes a memory 4 in which chronological and/or spatial non-use ranges are stored for each mobile radio subscriber or mobile phone.

5 These ranges are time periods or geographic ranges in which use of the corresponding mobile phone 2 is not desired.

These non-use ranges can be determined by each mobile radio subscriber himself/herself. This can be made, for example, via an appropriate entry at the mobile phone 2 with subsequent transmission of the data to the network operator or 10 the base station 1 or by signaling to the network operator or the service provider. When the information relating to the non-use ranges is transmitted to the service provider, the latter collects the information relating to the non-use ranges of all the mobile phones 2 for which it is responsible and passes it on to the network operator 1 or to the individual base stations 1 of the mobile radio network. Likewise, it is 15 possible for specific geographic locations, for example hospitals, etc., in which use of mobile phones is not desired, to be defined to the service provider or network operator as non-use ranges by the locations themselves. For this purpose, such locations must also signal their geographic data to the network operator or service provider in order to be able to be subsequently monitored.

20 As has already been mentioned, the non-use ranges can be seen not only in spatial but also in chronological terms. For example, a mobile radio subscriber may be interested in receiving no calls between 8.00 p.m. and 10.00 p.m. In such a situation it is appropriate for the mobile radio subscriber to have an automatic adjustment facility for these chronological non-use ranges on his/her organizers, so 25 that the mobile radio subscriber cannot be disturbed by the calls during important meetings, for example.

While the monitoring of the chronological non-use ranges can be carried out relatively easily via a time measuring device, the monitoring of spatial non-use ranges is more complex because, to do this, the position of the mobile phone 2 30 always has to be sensed. For this purpose, according to Fig. 1, a corresponding device 3 is provided which senses the instantaneous position of the mobile phone 2

with sufficient precision. The device 3 can be coupled, for example, to a GPS (Global Positioning System) system, by which corresponding information relating to the positions of the individual mobile phones 2 is supplied in the form of their geographic longitude and latitude. It is also conceivable for the device 3 to

5 determine the position of the mobile phone 2 with respect to known geographic reference points. For example, the position of the mobile phone 2 within the mobile radio network can be determined using a triangulation method with respect to the known position of three base stations 1 if, for example, the propagation time differences of a signal transmitted by the mobile phone 2 are evaluated with respect

10 to the three base stations 1.

The non-use ranges stored in the memory 4 are monitored by a controller 6 with reference to the position data supplied by the device 3 and the instantaneous time data, in order to determine a possible collision and, if appropriate, initiate a corresponding measure. If the owner of a mobile phone moves, for example, into

15 the vicinity of a predefined non-use range, for example into the vicinity of a hospital or if he/she is less than a specific minimum distance away from this non-use range, he/she is requested by the controller 6 not to use the mobile phone 2. For such a "request", various measures are conceivable. In the simplest case, only

20 an appropriate message, which can be in the form of a SMS message or via a call with an automatic announcement, is automatically transmitted to the mobile unit 2. Likewise, it is possible to activate an automatic call forwarding facility which ensures that incoming calls for the mobile phone 2 are automatically forwarded to another, assigned receiver; in particular, to a voicemail box or to a telephone answering machine. Furthermore it is conceivable, when a non-use range is

25 reached, to replace the ringing of the mobile phone 2, in the event of a call, by vibration, for which purpose corresponding mechanisms are already known. As a result, at least the suppression of disruptive ringing noises is avoided. Moreover, the user can be signaled optically, for example by flashing of his/her radio clock etc., which also requires him/her to switch off the mobile phone 2. Finally, in the

30 most extreme case, the mobile phone 2 can be switched off automatically by the mobile phone itself or via the network operator, in which case it should be ensured,

however, that an emergency call is still possible. In all cases, the measure taken is preferably cancelled again after the subscriber leaves the non-use range, so that unrestricted use of the mobile phone 2 is always possible outside the desired or predefined non-use ranges.

5        In order to avoid confusing the user, it is recommended that the owner of the mobile phone 2 is always informed of the current state of his/her device, which can be carried out, in particular, via an appropriate screen display (for example, "You are currently in a non-use range and your unit has been switched off"), so that the user can distinguish, in particular between automatic switching off when the 10 non-use range is reached and an area of no radio coverage or a time when his mobile phone 2 is defective or the battery is exhausted.

In principle it is also conceivable to configure the control device 6 in the form of what is referred to as a short range communication device which initiates 15 respectively necessary action for the non-use of the mobile phone 2 via an additional control signal or information signal transmitted to the mobile phone 2. In order to avoid influencing the actual mobile radio network, this control information or information signal is transmitted here on a different wavelength from that of the actual mobile radio communication signal. This control signal or information signal thus can, for example, be transmitted in a GSM mobile radio 20 network in the form of a blue tooth signal or infrared signal and evaluated in the mobile phone 2 by a correspondingly configured receiver.

In the example shown in Fig. 1, the devices 3, 4 and 6 are coupled to the base station 1 or assigned to the network operator. However, it is, of course, also conceivable for these units to be integrated into the mobile phone 2, in which case 25 the memory 4 only stores the non-unit areas of the corresponding mobile phone 2. Furthermore, in this case, each mobile phone 2 can automatically determine its geographic position via a device 3 by virtue of the fact that the device 3 is configured, for example, as a GPS transceiver unit or evaluates, in terms of its propagation time differences, a signal which is emitted simultaneously by three 30 base stations 1 with known geographic positions. When the devices 3, 4 and 6 are integrated into the mobile phone 2, the controller 6 can then directly initiate the

corresponding action for the non-use of the mobile phone on the same mobile phone 2.

It is particularly advantageous if the "severity" of the measure or action to be taken is adapted to the necessary urgency of the non-use of the mobile phone 2.

5 This will be explained in more detail below with reference to flowcharts shown in Fig. 2.

As has already been explained, the chronological and/or spatial non-use ranges are firstly defined by the owner of the mobile phone himself/herself or by a corresponding location and this information is collected (Step S100). Whether 10 these predefined non-use ranges are reached is then monitored (S101) automatically and continuously and a check is made to determine whether there is a collision between the instantaneous time and the chronological non-use ranges or the instantaneous position of the mobile phone and the spatial non-use ranges (S102). This can be done, for example, by monitoring a relatively widely formulated 15 limiting value for the time period between the instantaneous time and the individual chronological non-use ranges or the distance between the instantaneous position of the mobile phone and the individual spatial non-use ranges. If there is no risk of a collision, it is ensured that unrestricted use of the mobile phone is possible. If 20 measures for the non-use of the mobile phone have previously been taken, they are cancelled again in this case (S103).

If, on the other hand, there is the risk of a collision with the predefined non-use ranges, a very tightly selected limiting value for the distance between the instantaneous time and the chronological non-use ranges or the instantaneous position and the spatial non-use ranges is firstly checked (S104). If there is, for 25 example, only a time period of 10s between the instantaneous time and one of the chronological non-use ranges or only a distance of 10m between the instantaneous position of the mobile phone and a spatial non-use range, a measure must be taken which reliably ensures that the mobile phone is used in the corresponding non-use range; i.e., forcible switching off of the mobile phone must be carried out (S108) 30 which is not reversed again during the Step S103 until it is sensed that the subscriber leaves the non-use range (S102). In a further Step S105, a further

limiting value is monitored, which corresponds to a lower level of urgency with respect to the limiting value monitored in Step S104. In the example shown in Fig. 2, it is checked here whether the time period between the instantaneous time and the chronological non-use ranges is shorter than 50s, or the distance between the 5 instantaneous position of the mobile phone and the spatial non-use ranges is less than 50m. If this is the case, an automatic call divert, for example to a voicemail box of the corresponding mobile radio subscriber, is activated (S107). If these limiting values are not fulfilled either, a relatively "harmless" measure is taken which has the purpose of merely requesting the mobile radio subscriber not to use 10 his/her mobile phone, this measure providing, for example, the transmission of a corresponding SMS message to the mobile phone (S106). The measures as taken in Steps S106 and S107 are also not reversed in the Step S103 until it has been determined in Step S102 that there is no longer the risk of a collision with the predefined non-use ranges.

15        Although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.